REMARKS

The Office Action raised an issue under 35 USC §101 with regards to claim 9 which is believed to be adequately addressed by our current amendment. If this does not resolve the issue, the undersigned attorney would appreciate a telephone conference.

The present invention provides a tracking control apparatus and method to improve the efficiency of judging a tracking polarity of a wobble groove that can be used, for example, in the new high density blue-violet laser optical disc systems.

As more data bits are stored in increasingly smaller storage mediums, such as optical discs with a radius of approximately 10 mm, problems of tracking and seeking are created that can not be adequately addressed by convention tracking control apparatus for optical discs with sector block structures.

The present invention employs ranges and parameters that include addresses in a wobble groove to improve format efficiency while allowing a smaller number of addresses to be included in one track. The present invention enables a desired target track to be reached in one seek even for a long-distance seek whereby a high speed and stable seek function can be performed. Reference can be made to the flow chart of Figure 10 and the respective embodiments of Figures 5 and 11 to appreciate the operation of the present invention.

Thus, it is possible to quickly and efficiently determine a stable tracking lead-in of an optical disc utilizing wobble grooves as tracks. This is accomplished by detecting a tracking error signal and a wobble signal from an optical spot focused on the optical disc. The relative moving speed between an optical spot and the tracks in a tracking-off state are determined from a zero-cross point cycle in the tracking error signal and the track pitch.

A polarity judgment unit can determine when the optical spot is on a land if a wobble

signal amplitude value is equal to or lower than a predetermined value in the vicinity of the zero-cross point.

A moving direction judgment unit can, when the relative moving speed is within a predetermined range and the polarity judgment unit has judged the optical spot is on a land, determine a moving direction of the optical spot relative to the tracks from a rise/decay direction of the tracking error signal. Based on these determinations, a control unit can vary the relative moving speed to perform a tracking lead-in while the moving direction judgment unit can determine whether the optical spot is moving from an inner circumferential track outward or from an outer circumferential track inward based on whether a differential coefficient of the tracking error signal is positive or negative.

These and other refinement features enable our present invention to operate even if an optical disc has an area in which no information has been recorded and there is no reflectance ratio difference between the grooves and lands. As a result, a high speed and stable activation in seek functions are now made available to the art.

The Office Action rejected each of the outstanding claims as being unpatentable over the Funamoto US Patent No. 5,587,986 in view of the Kasai et al. US Patent No. 4,866,687.

The Funamoto US Patent No. 5,587,986 represents the work of Pioneer Electronic Corporation in 1994 and more particularly, discloses a solution to a perceived problem that occurred when a carriage was moved at a high speed relative to an optical disc of a sample servo format where a servo block would be constituted by servo bytes of two bytes and subsequent data bytes of 16 bytes. The servo bytes being constructed by two wobble bits of a third or fourth channel bit and an eighth channel of a first byte and having one clock pit of a twelfth channel bit of the second byte. The problem occurred when the carriage moved at a high speed and the

clock pit and the servo block could not always be sampled on the track and between the tracks. As a result, the number of samples would decrease and an accurate mean value of the amplitudes of the clock pits could not be adequately obtained. Thus, errors in recognizing an on-track position could occur. Additionally, the number of latch circuits, adding circuits and the like for detecting the clock pits, sampling the number of amplitude values and storing them resulted in an increase in cost and a complication to the circuit.

The Funamoto reference recognized a specific problem in optical discs formatted with servo blocks by purportedly creating a circuit that could be "cheaply realized by a simple construction", see Col. 4, lines 21-22.

Thus, a person of ordinary skill in this field could readily appreciate, by comparing the prior art Figure 2 with the invention of Figure 4, that the teaching constituted adding an adder 100 so that the conventional signal of the three or four channel clock and a signal of the sample and hold circuit, which was utilized to sample and hold the output of the eight channel clock, would be connected to the adder 100 and then a dividing circuit 101 would divide the output into a half. Thus, the mean value of the signals of the photo detectors at the timings of the three channel or the four channel clock and the eight channel clock in the same servo byte (mean value of the amplitudes of the two kinds of wobble bits) was obtained. The output of the mean value circuit and the output of an additional sample and hold circuit 6, which sampled and held the twelve channel clock as a clock pit, are then connected to a comparator 102 for comparing the outputs. The magnitude of the comparison output is judged and when sufficiently large, it was assumed that an on-track signal was adequately obtained.

As can be readily appreciated, this solution to a problem of approximately 13 years ago does not recognize the modern problems addressed and resolved by the present invention.

Thus, one highly relevant inquiry in making an evaluation under 35 U.S.C. §103 is "[t]he relationship between the problem which the inventor. . . was attempting to solve and the problem to which any prior art reference is directed." *Stanley Works v. McKinney Mfg. Co.*, 216 USPQ, 298, 304 (Del. D.C. 1981). Thus, in analyzing the prior art under Section 103 of the Act, we must clearly comprehend the problem addressed by the present inventors and that problem must be compared or contrasted, as the case may be, with the problems addressed by the prior art.

The Office Action, noting a deficiency of the Funamoto reference, reached even further back to 1985 to the early stages of optical disc storage access methods in citing the Kasai et al. US Patent No. 4,866,687 to purportedly teach a speed calculation unit for determining a relative moving speed between an optical spot and a track.

As can be appreciated, the Kasai et al. reference was seeking a solution to problems occurring in controlling the light spot positioning by utilizing a coarse actuator, such as a linear motor for moving an optical head, and then further relying upon a fine actuator such as a galvanomirror or voice coil for driving an objective lens mounted on the optical head. Kasai et al. noted that, the prior art in attempting to address problems associated with what was considered at that time a high speed seek requiring a longer settling time relative to the coarse seek time, had sought to utilize another seek control approach known as cross tracking. The problems occurred in the "high speed" seek operation because of the coincidence of an intermingling of the header and data signals with track traverse pulses thereby causing errors in the counting of the tracks. The solution was to balance a cross track seek operating time relative to the time period in which the band of the header and the data signals recorded on the disc will not coincide with the band of track traverse pulses generated when the light spot moves across each track. By thereby timing it so that the signals can be separated, it was presumed that the

tracks can be counted correctly and the light spot moved at an optimum high speed without creating this error.

In essence, a coarse movement mechanism moved the optical head to a position so that it was short by a small enough distance from the target, by making reference to an external scale such as a linear encoder. At an appropriate timing relative to this initial operation, the cross track seek operation was utilized for the fine movement mechanism. In essence, the timing permitted the coarse seek operation to enter a settling phase and then a simultaneous operation of the coarse movement mechanism and the fine movement mechanism could operate in unison to move the light spot. Subsequently, a tracking operation would take place temporarily to evaluate any deviation by reading a current track address. The fine movement mechanism could then be implemented to provide any positional modification or jump control so that the light spot is then positioned on the target track.

As the Examiner is aware, the hard question is whether the combination is based upon hindsight from the present teaching rather than what would be obvious apart from the present teaching to a person of ordinary skill in this field.

As set forth in *In re Kahn*, 441 F.3d 977, 987-988 (Fed. Cir. 2006):

> The motivation-suggestion-teaching test picks up where the analogous art test leaves off and informs the *Graham* analysis. [*Graham v. John Deere Co.*, 383 U.S. 1, 13-14 (1966).]
>
> To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, the Board must provide some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct. The requirement of such an explanation is consistent with governing obviousness law. . . .
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> A suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as "the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. . . . The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be *some* articulated reasoning with *some* rational underpinning to support the legal conclusion of obviousness. This requirement is as much rooted in the Administrative Procedure Act [for our review of Board determinations], which ensures due process and non-arbitrary decision making, as it is in §103.

As can be appreciated, the more that the cited references must be modified to meet the outstanding claims, the more likely that an unintended issue of hindsight may drive the rejection. This is particularly true for an Examiner who is attempting to provide a diligent effort to ensure that only patentable subject matter occurs. The difficult issue is to step back from the zeal of the examination process and to appreciate that the Patent Examiner has to wear both hats of advocating a position relative to the prior art, while at the same time objectively rendering in a judge-like manner, a decision on the patentability of the present claims.

The Office Action specifically indicated that our signal detection unit, as defined in our claims, could be found in the Funamoto reference at Col. 6, lines 1-6, and that our polarity judgment unit could be found at Col. 3, lines 39-47. The Office Action further contended that the speed calculation unit of our present invention was disclosed respectively in Col. 2, lines 50-55, Col. 7, lines 47-66 and Col. 15, lines 62-65 of Kasai et al. and that finally, our moving direction judgment unit could be found in Col. 7, lines 17-39 of the Kasai et al. reference.

As can be appreciated, the Office Action is attempting to mingle an addressing of a specific problem in 1985 with a separate solution to a problem in 1994 to purportedly address a

high density small optical disc and the resulting constraints that are imposed in today's storage mediums. Applicant respectfully traverses this assumption which appears to be the lynch pin of the present rejection.

However, even if hypothetically, without a teaching reference, it was accepted that there could be some form of motivation for combining these two references, the present rejection would fail. Specifically, the Kasai et al. reference teaching relied upon, at Col. 7, lines 47-66, was alleged to disclose that the relative speed could be obtained from the cycle and track pitch of the edge detection signal (the negative edge signal 53 and the positive edge signal 54 shown in Figure 4) to thereby detect the edges that rise and fall of the grooves. Needless to say, this structure is patentably different from the structure utilized in our present application.

Additionally, the Funamoto reference which purportedly disclosed a polarity judgment unit equivalent to our invention, as taught in Col. 3, lines 39-64, actually was a description of the prior art that was found to be defective by Funamoto as follows:

> The on-track detecting circuit will now be described. The output of the latch circuit 9 is supplied to a detecting circuit 26. The detecting circuit 26 detects an inversion (zero-cross) of the polarity of the tracking error signal and generates a detection signal to a circuit (not shown). When the inversion of the polarity is detected, the detecting circuit 26 generates a timing signal to a latch circuit 10 (or 11). When the next inversion of the polarity is detected, the detecting circuit 26 generates the timing signal to the latch circuit 11 (or 10). The latch circuits 10 and 11, accordingly, alternately latch the output of the latch circuit 6 every inversion of the polarity of the tracking error signal. An adding circuit 23 adds outputs of the latch circuits 10 and 11 and generates the mean value. The mean value is latched by a latch circuit 12 at a predetermined timing. Since the latch circuit 6 latches the level at the timing of the clock pit, the latch circuit 12, consequently, latches the means value obtained in a manner such that a clock level when an information detection point traces just on the track and a clock level when the information detection point traces just between the tracks are added and a resultant value is divided by 2. A comparing

> circuit 16 compares the output of the latch circuit 6 and an output of the latch circuit 12. When the former output is equal to or larger than the latter one, it is regarded that the information detection point is located on the track, so that an on-track signal is generated.

Thus, this above prior art description in the Funamoto reference suggests that an on-track signal is generated based on only a zero-cross signal of the tracking error signal. As can be readily determined, our present invention as set forth in our claims defines a polarity judgment unit as operable to judge that the optical spot is on a land "if a wobble signal amplitude value is equal to or lower than a predetermined value in the vicinity of zero-cross point."

Finally, the Office Action contended that our moving direction judgment unit was taught by Figure 4 of the Kasai et al. reference, which provided a track traverse pulse each time a light spot went across the center of a guide groove as described in Col. 7, lines 17-39. As can be appreciated, the signal output from this described circuit was based upon the inputting of a tracking signal 52 and a reflection intensity signal 51.

The structure defined in our moving direction judgment unit is operable based upon when the relative moving speed is within a predetermined range and when the polarity judgment unit has judged that the optical signal is on a land wherein the moving direction judgment unit can judge a moving direction of the optical spot relative to the tracks "from a rise/decay direction of the tracking error signal".

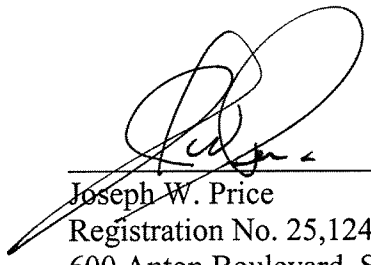
In summary, applicant submits that there is no motivation for a person of ordinary skill in this field to combine two significantly old prior art references that were attempting to address separate contemporary problems of 1985 and 1994. Even if the hybrid circuit structure taught by these respective references were hypothetically combined on the basis of some motivation or teaching not of record, they could not collectively teach the elements defined in our present

claims.

For the above reasons, it is believed that the present application is now in condition for allowance and an early notification of the same is requested. If the Examiner believes a telephone interview will assist in the prosecution of this matter, the undersigned attorney can be contacted at the listed phone number.

Very truly yours,

SNELL & WILMER L.L.P.



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